DOCTOR ALLEN (Closing).—I certainly do not wish to imply that protein hypersensitiveness can be ignored as a cause of eczema. The wheal reaction to the scratch or intradermal protein tests is not eczema and does not constitute conclusive proof of the eczematogenous effect of a substance. But it is unquestionable that an allergic reaction to proteins plays an important part in the production of some cases of eczema. Irrespective of whether the effect of such protein sensitization is a direct or an indirect one, it should be given full consideration in the approach to a case.

The point I wished to stress was the relative importance of external contactants in the production of adult eczema. As Doctor Piness has pointed out, I have used the qualifying term "adult" because I believe this type usually represents a different etiology from that concerned in infantile eczema.

True "atopy" seems to be an inherited characteristic and allergic symptoms may appear at birth or shortly afterward. Epidermal sensitivity to contact excitants, however, requires repeated exposure (frequently years) for its production. Therefore this type of reaction is seldom seen in infants. On the other hand, eczematous reaction to endogenous proteins as seen in infantile eczema tends to compensate spontaneously and usually disappears in childhood. Some individuals, it is true, carry an infantile eczema into adult life without remission, and cases of adult eczema have been reported so highly sensitive to a food that the ingestion of a minute amount would cause an eruption.

In the main, however, recent studies have given more and more importance to contact excitants in adult eczema at the expense of endogenous proteins.

X-RAY ASPECTS OF FUNCTIONAL DISORDERS OF THE COLON*

By HOWARD E. RUGGLES, M. D.
San Francisco

DISCUSSION *by R. G. Taylor, M. D., Los Angeles; Carl B. Bowen, M. D., Oakland; Charles M. Richards, M. D., San Jose.*

MOST writers on irritable colon emphasize the importance of the nervous element in its causation, and any extended experience with these patients confirms that impression. The nerve supply to the descending colon and sigmoid, which are the segments commonly affected, is intimately related to that of the pelvic organs, and both sympathetic and craniosacral fibers are distributed throughout the colon. The internal sphincter and adjacent colon are innervated from thoracolumbar fibers through the inferior mesenteric and the hypogastric nerves which latter are also an afferent path from the bladder and pelvic organs. There is also a cranosacral supply through the pudendal nerve. Sympathetic activity causes a relaxation of the internal sphincter and rectum and, to a less extent, of the sigmoid and descending colon. Craniosacral impulses have an opposite effect. Thus the appearance of the colon is a good index of the balance between sympathetic and parasympathetic systems, a large colon representing sympathetic preponderance and a small one lowered sympathetic or increased craniosacral activity. The extrinsic control of the bowel is well shown in the results of sympathectomy in cases of megacolon, interruption of the sympathetic innervation producing a striking contraction in the diameter and length of the gut.

COLON TYPES

The size and position of the colon varies with the type of individual. A stocky, heavy-set male, with a small hypertonic stomach and perhaps a tendency to high blood pressure, will usually have a large redundant colon, all evidence of a relatively active sympathetic system. In contrast, we find the thin asthenic person, more commonly a woman, with a large atonic stomach and a short, narrow colon lying in the iliac fossa, showing a low blood pressure, with frequent complaints of colon discomfort, attacks of diarrhea, and the usual story of an irritable colon.

These are the hyposympathetics, and perhaps adrenal cortex is what they need. The emotional element is strong and often based upon a background of fear, social or family conflicts, or even a sudden drop in the Dow Jones averages. Men seem to manifest nervous strain and exhaustion at the pylorus, women in their colons. "Old maids" of both sexes are apt to be constipated.

There is a definite reciprocal relation between the behavior of the ascending and the lower descending portions of the colon. We are all familiar with the great dilatation of the cecum which occurs in obstruction of the descending segment, and some recent studies in Chicago have shown that an increase of tone in the descending colon causes a direct relaxation of the ascending portion. Peristalsis in the ascending colon is often accompanied by shortening of the distal segments. The ascending colon appears to be a dehydrator and the site of bacterial and cellulose digestion. The transverse and descending portions accomplish additional dehydration and gradual onward propulsion of their contents.

HOW NORMAL COLONS VARY FROM DAY TO DAY

In following individual normal colons day after day, we have been impressed by the variability of the same colon in tone and motility and the influence of an adequate water intake. An ample supply of water in persons not accustomed to it means quicker evacuation of the cecum and a less tonic descending portion. It is interesting that in several of the female patients there was a striking evacuation of the transverse and descending colon beginning two days before the onset of menstruation. Doctor Stone at the University of California Hospital has recently demonstrated changes in the length and size of the colon by refilling the bowel after a first enema has been expelled. Dilated loops are found narrower and shorter and the whole tone of the gut is often increased at least temporarily.

X-RAY EVIDENCE OF COLON IRRITABILITY

The x-ray evidence of colon irritability is found in hypertonicity of the transverse and descending colon; in broad, deep and widely spaced haustral constrictions or a comparative absence of haustra. Occasionally in acute cases we see fine, closely spaced constrictions of unequal depth which prob-

* Read before the joint meeting of the Radiology and General Medicine Sections of the California Medical Association at the sixty-first annual session, Pasadena, May 2-5, 1932.

ably represent a temporary interruption of extrinsic control, a sort of local fibrillation. There may be delayed emptying (beyond seventy-two hours) or very rapid clearing. After enema the normal colon tends to retain about half its content; the irritable bowel may empty completely. In some cases with an unusual amount of mucus, thin strands of barium-covered mucus may be seen following evacuation of the bowel or after mass movements within it, the so-called "string sign."

Visualization by means of a barium meal gives a better idea of the natural tone and motor power of the intestine than an enema, although for the sake of completeness, an enema should conclude every colon study. A film twenty-four hours after the enema sometimes supplies useful information. The rate of filling by enema and the patient's reaction to it are of considerable importance in a final estimate of the case.

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DISCUSSION

R. G. Taylor, M. D. (1212 Shatto Street, Los Angeles).—Doctor Ruggles has given a very good exposition of this difficult and rather nebulous subject. I should simply like to emphasize that a complete study, including observations of the opaque meal, and of the opaque enema, are probably needed in most patients. Even then definite deductions of value are frequently difficult. Useful information can often be obtained where an enema only is given, by sending the patient to the toilet; then making films and fluoroscopic observation after the evacuation of the enema. The colon frequently shrinks down and gives a very markedly different appearance. Also it is important to differentiate between functional disturbances and changes and some of the lesions that cause mechanical interference with the enervation. These latter may be difficult to demonstrate. However, careful study with both meal and enema will usually show some evidence of them.

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Carl B. Bowen, M. D. (1624 Franklin Street, Oakland).—Doctor Ruggles is to be congratulated on presenting a paper calling attention to some of the diagnostic factors in one of the most difficult and uncertain roentgen-ray examinations.

I would like to stress the importance of a complete and careful examination, making both fluoroscopic and film examinations following an opaque enema, again following evacuation of the enema, and last but not least, following insufflation of the colon, particularly in the indefinite case. It is only by such means that one can feel at all secure in his interpretation.

I would like to ask Doctor Ruggles if the commonly seen spastic colon, the small contracted colon which takes only a very small enema and shows no ulcerative change, and the smoothed-out colon seen in mucous colitis, are all the result of different degrees of the same nervous stimulation, or is each the result, at least in part, of an entirely different type of nervous stimulation? Has he ever seen a typical mucous colitis colon that either allergy or infection alone could be proved as the cause? Has he ever seen a mucous colitis colon return to a normal roentgenologic appearance following treatment? Has he seen any change in the appearance of the colon of the nervous patient following the administration of sedatives as, for example, one of the barbital group?

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Charles M. Richards, M. D. (303 Medico-Dental Building, San Jose).—In this paper Doctor Ruggles has given expression to observations that I am sure all radiologists have made repeatedly in the course of their examinations of colons incident to the routine roentgen gastro-intestinal examinations. Quite frequently the conclusions on those observations were the noncommittal "gastro-intestinal tract negative" based on the fact that no intrinsic pathology was found in the stomach or intestines. The conclusions were often erroneous, however, for we have failed repeatedly to suggest to the referring physician the significance of certain manifestations in the colon, particularly, which were obviously of a functional nature, and hence given scant consideration, when they might have been indicated as sign-posts pointing to a very definite pathologic process elsewhere or to a psychic or sympathetic imbalance which was causing the patient just as much suffering as though an actual pathologic process were present.

Doctor Ruggles has given us very concisely the anatomic and physiologic bases of the ability of the colon to express so many things. I am sure, did we but read the colons of our patients more exactly, they would reveal to us many leading truths that have heretofore passed unnoticed or disregarded.

I cannot help but feel that the emphasis thus placed on this subject is just one more argument for the consulting radiologist's insisting on a full clinical knowledge of the case under investigation, in order that the interpretations of his findings may be more human and hence more valuable.

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Doctor Ruggles (Closing).—In answer to Doctor Bowen, I believe the markedly spastic colon represents in general a vagus preponderance, and the smoothed-out colon, usually atonic, a sympathetic hyperactivity. It is probable that all mucous colitis is a nervous manifestation, and we have seen many cases of this type become normal with a stabilization of the nervous system. In our experience, barbital does not make so much difference in the appearance of the colon as it does in its function.

SOUTH AMERICAN TRYPANOSOMIASIS OF THE HUMAN TYPE—OCCURRENCE IN MAMMALS IN THE UNITED STATES*

By Charles A. Kofoid, Ph. D., Sc. D., and Fae Donat, A. M.

IN 1916 Kofoid and McCulloch[1] described a trypanosome from the digestive tract of *Triatoma protracta,* the cone-nose bug, often called the kissing bug, and locally known as the China bedbug, or crossbug, because the folded wings are cruciform (see Fig. 1). These bugs live in considerable numbers in the large brush-pile nests of the wood rats (*Neotoma*), and occasionally in the subterranean nests of the meadow mice (*Microtus*), two genera of rodents widely distributed in the western United States. These bugs fly at night and are attracted to lights in houses and in camps in the open. They are blood-sucking insects which feed in the laboratory at intervals of one to three weeks, engorging the digestive tract with blood, and defecating at the site of the bite.

CONE-NOSE BUGS—HABITATS IN CALIFORNIA

These bugs in nature, collected at several localities from some but not all nests examined in San Diego County, are very heavily and very generally infected with the flagellate which was described as *Trypanosoma triatomæ.* The infection occurs in a variety of typical developmental stages, including the trypanosomal, crithidial, trypani-

* From the Zoölogical Laboratory, University of California.